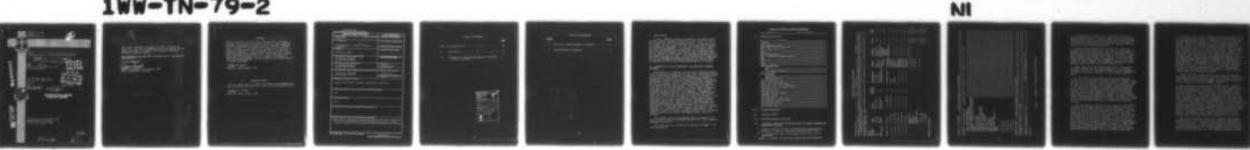


AD-A069 687

WEATHER WING (1ST) HICKAM AFB HI  
A METHODOLOGY TO ANALYZE FORECAST PROBLEMS. (U)

F/G 4/2

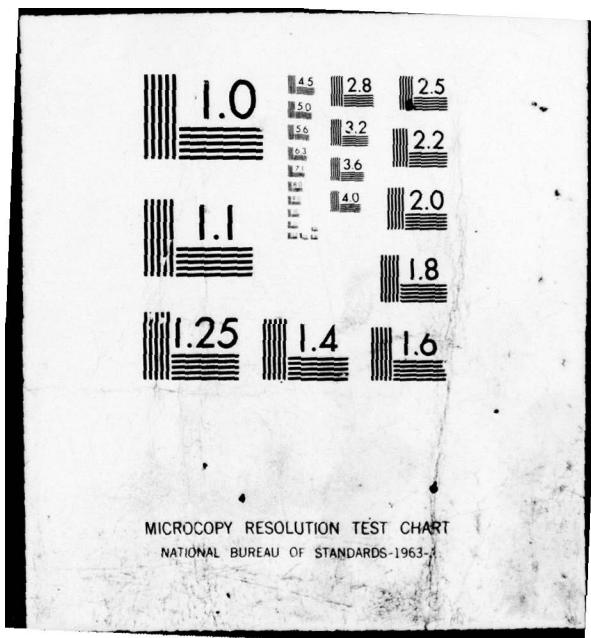
UNCLASSIFIED



| OF /  
AD  
A069687



END  
DATE  
FILED  
7-79  
DDC





14  
1WW-TN-79-2

2

ADA 069687



1st Weather Wing/DON  
Hickam AFB, Hawaii 96853

11  
9 Apr 79

12 13p.

Headquarters 1st Weather Wing  
United States Air Force  
Hickam AFB, Hawaii 96853

DDC FILE COPY

6  
A Methodology to Analyze Forecast Problems.

9 Technical notes

10 Phillip D. Wood Major, USAF

LEVEL  
DDC  
REF ID: A65114  
JUN 11 1979  
REGULUS C

APPROVED FOR PUBLIC RELEASE;  
DISTRIBUTION UNLIMITED

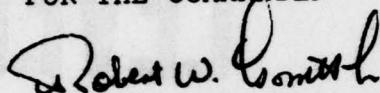
79 05 30 247  
372450  
Date

1493

This report approved for public release. There is no objection to unlimited distribution of this report to the public at large, or by DDC to the National Technical Information Service (NTIS).

This technical note has been reviewed and is approved for publication.

FOR THE COMMANDER



ROBERT W. GOSSETT, JR, Colonel, USAF  
Chief, Operations Division

DDC Lite Cob

## PREFACE

AWS forecasting units must have programs that routinely evaluate the quality of forecasts and local point warnings. Technical improvement programs are also needed to maintain and to improve the technical quality of forecast products. There are many factors which can contribute to a decline in forecast performance. Unit managers need to be able to define the causes of deteriorating performance and to implement necessary corrective actions. This technical note describes a methodology that unit managers can employ to define forecast problems, likely causes, and actions required to correct problems.

*Philip D. Wood*

PHILLIP D. WOOD, Major, USAF

## ACKNOWLEDGMENTS

I wish to thank Capt Al Simoncic and CMSgt John Ellington for their proposals regarding the content of this technical note.

*Philip D. Wood*

PHILLIP D. WOOD, Major, USAF

## UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 1WW-TN-79-2	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle)  A Methodology to Analyze Forecast Problems		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s)  Phillip D. Wood		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS  1st Weather Wing/DON Hickam AFB HI 96853		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS  1st Weather Wing/DO Hickam AFB HI 96853		12. REPORT DATE 09 April 1979
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)  1st Weather Wing/DON Hickam AFB HI 96853		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report)  Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)  NA		
18. SUPPLEMENTARY NOTES  NA		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  This report describes a problem analysis methodology recommended for use by base weather station managers whenever an adverse trend in forecast or local point warning performance is observed.		

TABLE OF CONTENTS

	<u>Page</u>
List of Illustrations . . . . .	iii
I. Introduction . . . . .	1
II. Description of the Methodology for Analyzing Forecast Problems . . . . .	1

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DDC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	<hr/>
By _____	
Distribution/	
Availability Codes	
Dist.	Avail and/or special
<input checked="" type="checkbox"/>	

REPORT DOCUMENT NUMBER

SECURITY CLASSIFICATION OF THIS REPORT

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Potential Problem Analysis Worksheet . . . . .	2
2	Problem Analysis Worksheet . . . . . . . . .	3

1. DATE PREPARED

TOE INFORMATION

DATE 2/14  
CAT 211  
Document No. 101-123456

SUPPLEMENTARY NOTES

2. DATE APPROVED

TOE INFORMATION

Last check date

ABSTRACT

3. APPROVAL SIGNATURE

4. APPROVAL DATE

5. APPROVAL SIGNATURE

6. APPROVAL DATE

## I. INTRODUCTION

In 1976, 1WW/DON prepared a worksheet to use when preparing for Special Technical Consultant Visits (TCVs) to units with significant forecasting deficiencies. Prior to a visit to a unit, that unit was forwarded a Potential Problem Analysis Worksheet (see Figure 1). The unit was asked to complete and return the worksheet. The purpose of this was to help the unit and 1WW/DON better understand the nature and causes of the forecast problem. This action helped 1WW/DON decide how to prepare for the Special TCV and what assistance should be provided during the visit. The remainder of this technical note will describe a problem analysis methodology recommended for use by base station managers whenever an adverse trend in forecast or local point warning performance is observed.

## II. DESCRIPTION OF THE METHODOLOGY FOR ANALYZING FORECAST PROBLEMS

Deterioration in forecast or local point warning performance is normally detected through the local evaluation program or review of TAFVER summaries. Comparison of unit performance versus locally developed or higher headquarters prepared performance standards clearly reveals substandard performance and adverse trends. Corrective actions are often implemented with little thought given to clearly defining the problem, to listing possible causes, and to determining the most efficient way to correct the problem. Often we react based on intuition or gut feeling rather than intelligent, thoughtful evaluation of pertinent facts and factors. The reaction response frequently results in an immediate, temporary technical fix followed later by problem recurrence and another series of trial and error attempts to cure the problem. These type efforts are costly considering the man-hours misused. Fruitless and prolonged discussions at forecaster seminars frequently take place. These can leave participating forecasters aggravated and wondering why so much of their time was blown. Wasteful gathering of masses of data for forecast studies, etc., sometimes takes place in this reaction type of response to a deterioration in forecast performance. The impulse to attack a forecast problem, without first systematically evaluating the adverse performance trend, must be avoided.

The problem analysis methodology shown in Figure 2 is a way to replace intuitive problem solving with a more rigorous, systematic procedure.

The three bits of information at the top of Figure 2 are self explanatory.

## POTENTIAL PROBLEM ANALYSIS WORKSHEET

Unit/Location: \_\_\_\_\_ Date of Analysis: \_\_\_\_\_

### \* 1. PROBLEM DEFINITION:

3, 6, 12, 24, All Hours \_\_\_\_\_  
Seasonal \_\_\_\_\_  
Cig/Vsby \_\_\_\_\_  
Optimism/Pessimism \_\_\_\_\_  
TRW, RASH, FG, K, Haze, Etc. \_\_\_\_\_  
TAF vs Persistence \_\_\_\_\_  
TAF vs CC \_\_\_\_\_  
Trends \_\_\_\_\_  
Which Categories \_\_\_\_\_  
What Verification Times (Local) \_\_\_\_\_  
OEP \_\_\_\_\_  
PEP \_\_\_\_\_  
LAP \_\_\_\_\_  
OESE \_\_\_\_\_  
Manning Shortage  
Leaves \_\_\_\_\_  
TDY \_\_\_\_\_  
Not Enough Assigned \_\_\_\_\_  
New Personnel  
Training \_\_\_\_\_  
Experience \_\_\_\_\_  
Time-on-Station \_\_\_\_\_  
All Forecasters \_\_\_\_\_  
Radar Available/Used \_\_\_\_\_  
Climo Data Available/Used \_\_\_\_\_  
Satellite Data Available/Used \_\_\_\_\_  
Rawinsonde Data Available/Used \_\_\_\_\_  
Too Many Visitors \_\_\_\_\_  
Abnormal Weather \_\_\_\_\_  
Implemented New Program \_\_\_\_\_  
Workload Changes \_\_\_\_\_  
TAF Worksheet \_\_\_\_\_  
Incorporation of All Data \_\_\_\_\_  
Tech Studies Available/Used \_\_\_\_\_  
ROT Available/Used \_\_\_\_\_  
Forecaster Seminar \_\_\_\_\_  
Self Inspection \_\_\_\_\_

### \*/\*\* 2. PROBLEM STATEMENT:

### \*\* 3. POSSIBLE CAUSES:

### \*\* 4. POSSIBLE REMEDIAL ACTION(s):

### \*\* 5. TECHNICAL CONSULTANT RECOMMENDATIONS OR HIGHER HEADQUARTERS ASSISTANCE REQUIRED:

- \* Based on entries in Item 1, describe what the problem is and when it began and summarize contributing factors.
- \*\* If insufficient space is provided for an entry, use an attachment.

Figure 1. Example of Potential Problem Analysis Worksheet

## PROBLEM ANALYSIS WORKSHEET

Unit/Location: \_\_\_\_\_

Date of Analysis: \_\_\_\_\_

REASON FOR ANALYSIS: \_\_\_\_\_ (Explain in terms of when problem began and trend of deviation from a performance standard)

Analyst: \_\_\_\_\_

PROBLEM DEFINITION: (Line through with pencil those items that do not help define problem; circle those items that do)

Which Local Product	Time	Trend	Cate-gories	Phenomenon	People	Guidance	Other	Sum- mary
TAF	Summer	Optimistic	A	Ceiling	Not Enough	New Proce- dures	_____	_____
LPW Met Watch	Winter Fall	Pessimistic Constant	B C	Visibility Thunderstorms	New Inexpe- rienced	New Program Revised	_____	_____
OPVER Fcst	Spring	2 Cat Misses	D	Rainshowers	Too Many Visitors	Forecast Techniques	_____	_____
3 Hr Fcst	1 Cat Misses	_____	Fog	Too Much Leave	_____	_____	_____	_____
6 Hr Fcst	_____	_____	Smoke	Too Much TDY	Workload	Changes	_____	_____
12 Hr Fcst	_____	_____	_____	_____	New Sec- tion Ch	_____	_____	_____
24 Hr Fcst	_____	_____	_____	_____	New Com- mander	_____	_____	_____
Morning	_____	_____	_____	_____	_____	_____	_____	_____
Afternoon	_____	_____	_____	_____	_____	_____	_____	_____
Night	_____	_____	_____	_____	_____	_____	_____	_____
Sunrise	_____	_____	_____	_____	_____	_____	_____	_____
Sunset	_____	_____	_____	_____	_____	_____	_____	_____
Verification	_____	_____	_____	_____	_____	_____	_____	_____
Hr	Z	Z	Z	Z	Z	Z	Z	Z

PROBLEM STATEMENT:

\_\_\_\_\_

\_\_\_\_\_

**IMPACT TO CUSTOMER:** \_\_\_\_\_ (Look at Section B of your TFRN)

**EVALUATE USE OR VALUE OF:** (Describe ways to improve use or enhance value, if any)

Centralized Products  
Local Analysis Program  
Forecast Preparation Procedures  
Forecast Preparation Worksheet  
Radar

Satellite Data  
Upper Air Data  
Integration of All Data  
Forecaster Discussions  
Forecast Studies  
Rules of Thumb  
Climo Data  
Case Studies  
Bust Reviews  
Unit Seminars  
Higher HQ Seminars  
TFRN  
TFRF

**PROBLEM CAUSES:** (Describe possible and most probable)

**RECOMMENDED CORRECTIVE ACTIONS:** \_\_\_\_\_

**PLANNED IMPLEMENTATION DATE:** \_\_\_\_\_      **ACTUAL IMPLEMENTATION DATE:** \_\_\_\_\_

**RESULTS:** \_\_\_\_\_

Figure 2. Example of Problem Analysis Worksheet

In documenting the "Reason for Analysis," the problem analysis will get off to a proper start if specifics can be determined and recorded. The specifics should include such things as the date or time the problem began and verification statistics that objectively show the current level and trend of the substandard performance.

In the "Problem Definition" section, you could line through those items that do not help define the problem. We suggest use of a pencil because later in the analysis you may determine that problem definition is incomplete. Blanks were purposely left below each column so you can add any items needed to help define the problem. In the far right column entitled "Summary" we recommend you write in all the items not lined through. The problem definition step will help you identify what the problem is and is not.

After completing the "Problem Definition," you should be ready to write the "Problem Statement." The problem statement should be a concisely worded statement summarizing the things that were identified in the problem definition step.

In the "Impact to Customer" section you should state how the defined problem is affecting customer missions. In Section B of your terminal forecast reference notebook (TFRN) you may have information that will give you thoughts on what to enter in this section of the problem analysis worksheet. In Section B of your TFRN all customer activities significantly affected by weather should be discussed along with customer actions that occur whenever significant weather criteria are actually exceeded or forecast to be exceeded. Also, the costs to the supported organization when adverse weather occurs should also be specified. The reason for this step in the problem analysis is to make you assess the impact to the customer associated with this particular forecast problem.

With the resource limitations that exist in base weather stations and elsewhere, we must devote available time and expertise to the most important forecast problems. For this reason, we should assign priorities to forecast problems in a way similar to the duty priority lists that are posted behind the briefing counter. We simply do not have the time and resources to attack all problems. We must be selective and choose to work on those that impact customers the most (i.e., are the most costly in terms of mission degradation and/or misuse of available flying hours, etc. These thoughts dovetail with the policy statement in AWSR 80-3 which indicates that technical improvement efforts of units with a local forecasting function must be directed toward forecast requirements which impact supported customers operations.

In the next part of the analysis we encourage your evaluation of the use of a number of things that are important in the forecast preparation routine. Evaluation of the use or value of each thing listed should be in terms of what the problem is. In other words, for each entry in the "Problem Definition" section in the column headed "Summary," consider whether and how centralized products or the manner in which they are locally processed and used may have caused the problem. Then describe ways to improve the use or value of centralized products. By doing this, you have begun to list things that should be done to correct the problem. After completing that action, then consider whether and how the local analysis program or any local analysis procedure deficiencies contributed to the entries in the "Problem Definition" section. Repeat the other actions described above. Again space is left under the section entitled "Evaluate Use or Value Of" for you to add important items we may have overlooked. This will be one of the more difficult sections of the problem analysis to complete. Meticulous attention to this section will enable you to uncover the most likely causes of the forecast problem.

In the "Problem Causes" section, the reason we call for documentation of the "possible" and "most probable" causes of the problem is because we don't want you to discard a "possible cause" that after additional thought and analysis, could turn out to be one of the "most probable" causes.

After stating or listing the "Problem Causes," describe those actions necessary to correct the current situation and reduce the possibility it may recur. You should have determined all the required corrective actions in the "Evaluate Use or Value Of" section. If possible, list the required actions in order of importance. It's appropriate at this time to think about who will be responsible for implementing each action and when. Progress reports should be prepared on a periodic basis to determine the timeliness and appropriateness of corrective actions. If progress is unsatisfactory, the previously completed problem analysis worksheet should be reviewed to see if any of the analysis was erroneous. Progress reports could be prepared in memorandum format and attached to the problem analysis worksheet. The overall "Results" of the corrective actions taken should be recorded when all actions have been taken. The analysis and progress report should be retained in case the problem raises its ugly head again sometime in the future.

We won't be offended if you don't implement this problem analysis methodology when a decline in forecast performance occurs at your unit. Our main purpose for this technical note is to encourage you to organize your thought process when you accomplish an analysis of a forecast problem. The next time you are confronted with a forecast problem, pull this technical note from the dusty corner of your terminal forecast reference

file bookcase. If you choose not to apply the problem analysis methodology we have described, at least structure your thinking so you can logically derive prudent decisions. If this technical note helped you in any way to do this, the effort to prepare this document was well worth it.

